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REVIEWS

Moræner i den Islandske Palagonitformation [Moraines in the Palagonite Formation in Iceland]. By HELGI PJETTURSSON. From Oversigt over det Konglige danske videnskabernes selskabs forhandling, 1901, No. 5.

THE author has before this¹ described the occurrence of ground moraines in the palagonite of Iceland. The present paper is a brief summary of this earlier account and a report on some later observations, with a statement of conclusions drawn from the same.

All former writers on the geology of Iceland have recognized as glacial deposits only such morainic accumulations as overlie the palagonite, and the latter has been regarded as a Tertiary eruptive containing local aqueous sediments. The present author finds ground moraines in palagonites and breccias lying under doleritic lavas that have heretofore been regarded as preglacial. The material is indurated and stony, cut by joints and dikes, but has the characteristic texture of ground moraines. He thinks that there can be no reasonable doubt that this material is of glacial origin, and he presents four good reasons for his view, viz.:

1. The structure of the beds.
2. The nature of the included blocks. These are usually somewhat rounded. Quite often they exhibit beautiful scorings. One of the most perfectly scored boulders the author had ever seen, he found in a "breccia" 100 feet thick, which appears as a gray belt on the bare rocky wall of Búrfells.
3. The "breccias" in some cases may be seen to rest on typically striated bed rock.
4. In some places where "breccias" resembling moraines rest on basalt, the upper surface of the latter is broken into fragments, which are worked into the base of the "breccia." One can see that some blocks of the basalt lie near where they were broken off, while other blocks have been carried farther away and are mingled with somewhat rounded boulders.

¹See *Scottish Geographical Magazine*, May, 1900.

These old glacial deposits occur on the north as well as on the south side of the island and frequently have a considerable thickness. At times lavas are interbedded in a way which suggests close proximity in time of the volcanic and the glacial forces. At other places there appear to be indubitable proofs of a general absence of glacial conditions at times of great volcanic activity. Doleritic lavas with their upper surface scored by the latest moraines, rise several hundred feet above old eroded surfaces of earlier glacial drifts. How many there are of the latter one cannot yet definitely say. Apparently there are more than one. It is noted that all these older moraines are associated with the palagonite tuffs, and there is some reason to think that they were made at some period during Miocene-Pliocene time. This, the author remarks, is a strange indication, in view of the what is known concerning the glacial age on the continent. But further investigations are needed to determine the age. The relation of the moraines to some fossil-bearing crags on the north coast promises more light on this question.

In the south half of the island the breccia plateau was for the greater part built after the moraines were made. The principal relief features of the land, as for instance the south lowland, are younger than even the uppermost of the palagonite moraine.

The heavy and extensively distributed ice-scored doleritic lava flows, show that there was a long interglacial period, for they overlie unconformably older moraines. The fossil-bearing crag at Tjörnes, already referred to, may prove to belong to this stage. Heretofore this deposit has been regarded as belonging to the Pliocene.

J. A. UDDEN.

The Cement Industry. Descriptions of Portland and Natural Cement Plants in the United States and Europe, with Notes on Materials and Processes in Portland Cement Manufacture. Reprinted from the *Engineering Record*, New York.

THIS interesting series of papers gives a very fair idea of the development of the cement industry at the time of their first publication a few years ago. Originally written for the *Engineering Record* by S. B. Newberry, Frederick H. Lewis, and others especially interested in cement, as independent articles describing typical cement plants of Europe and America, they are now published, together with an appro-